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(71) Applicants

Agfa-Gevaert

Aktiengesellschaft,

Leverkusen,

West Germany

(72) Inventors

Dieter Engelsmann

Hubert Hackenberg

Dieter Maas

Gerda Linke

Alfred Bäessler

(74) Agents

Marks and Clerk,

Alpha Tower,

A.T.V. Centre,

Birmingham B1 1TT

(54) Camera including a spool-less film take-up compartment

(57) A camera housing 1 includes a compartment which receives a container 6 of photographic film and a spool-less take-up compartment 7 which receives film 5 fed from the container 6. A guide lever 9, carrying a roller 8 at its free end, projects into the take-up compartment 7 to define with the side wall of the latter a small space, the lever 9 being configured to shape a leading end 5a of the film into an initial coil in the said space. As the film 5 becomes progressively coiled in the space and the diameter of the coil increases, the lever 9 pivots against the bias of a spring 11 to enlarge the space. A guide assembly 12, 23 is provided to guide the film from a film track 2 into the take-up compartment 7. The camera includes a film transport device (not shown), eg a sprocket wheel or gripping device.

Fig.1

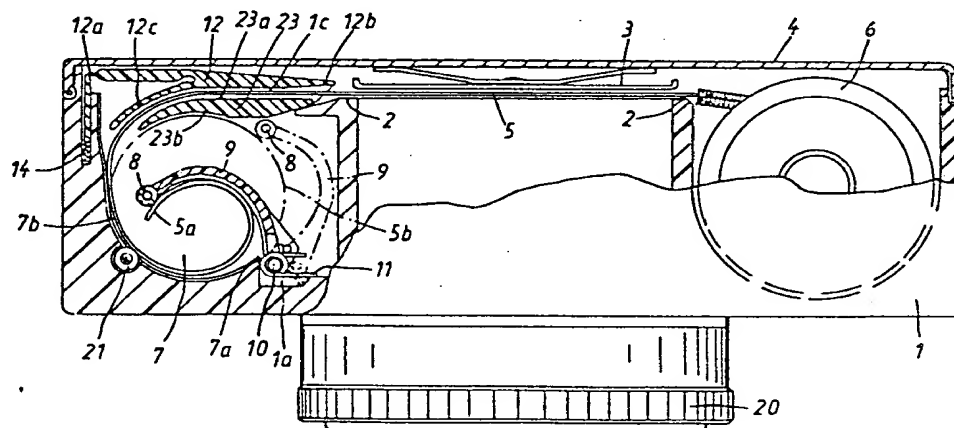
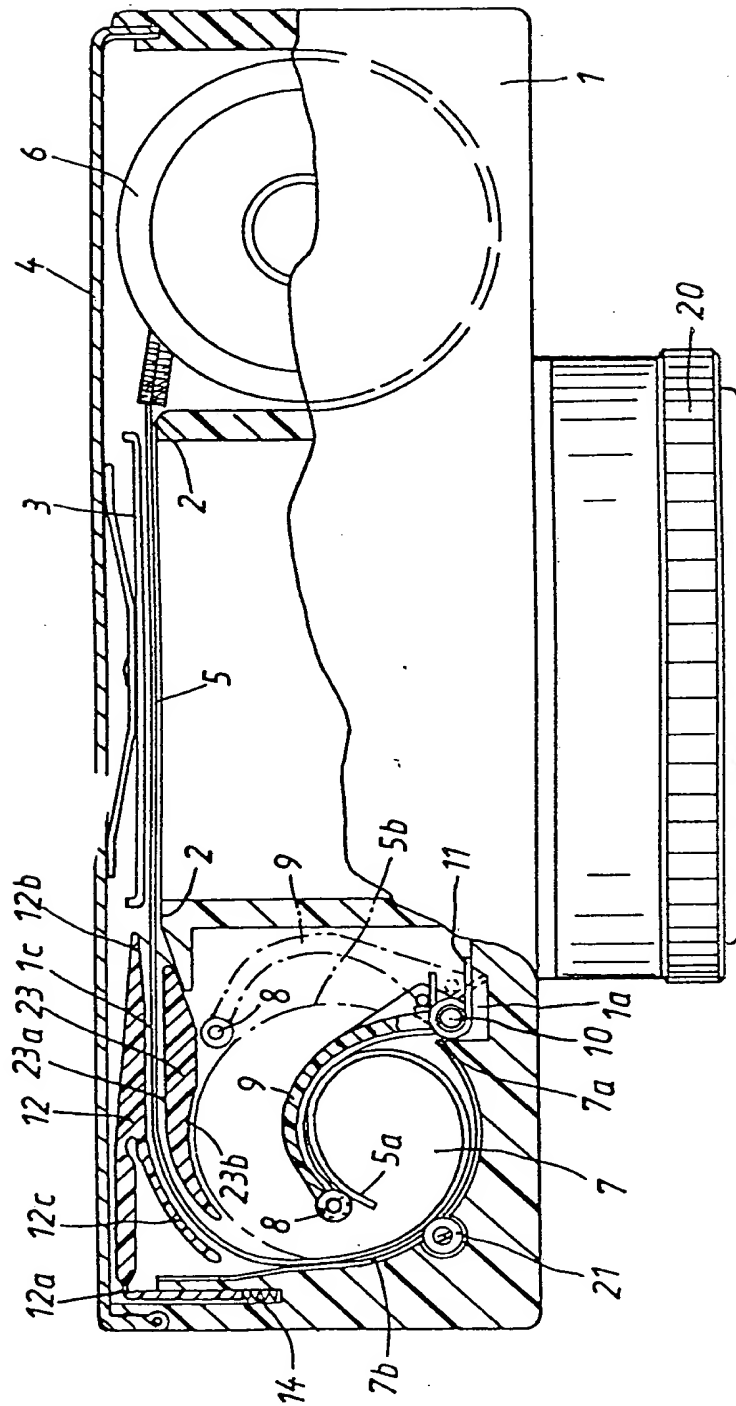


Fig.1



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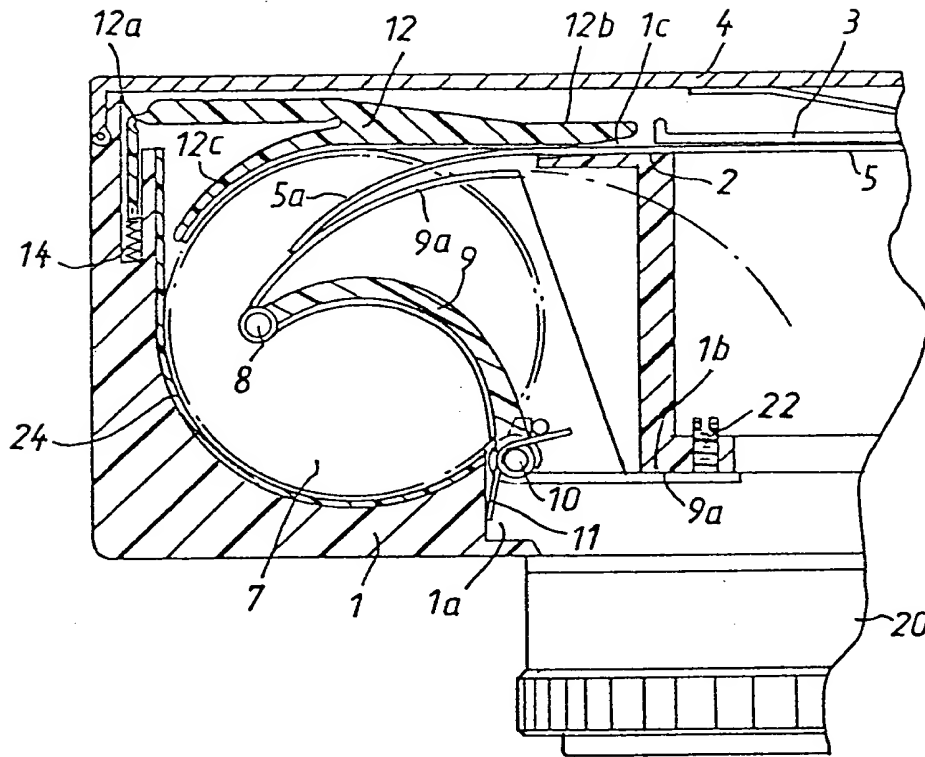


Fig. 2

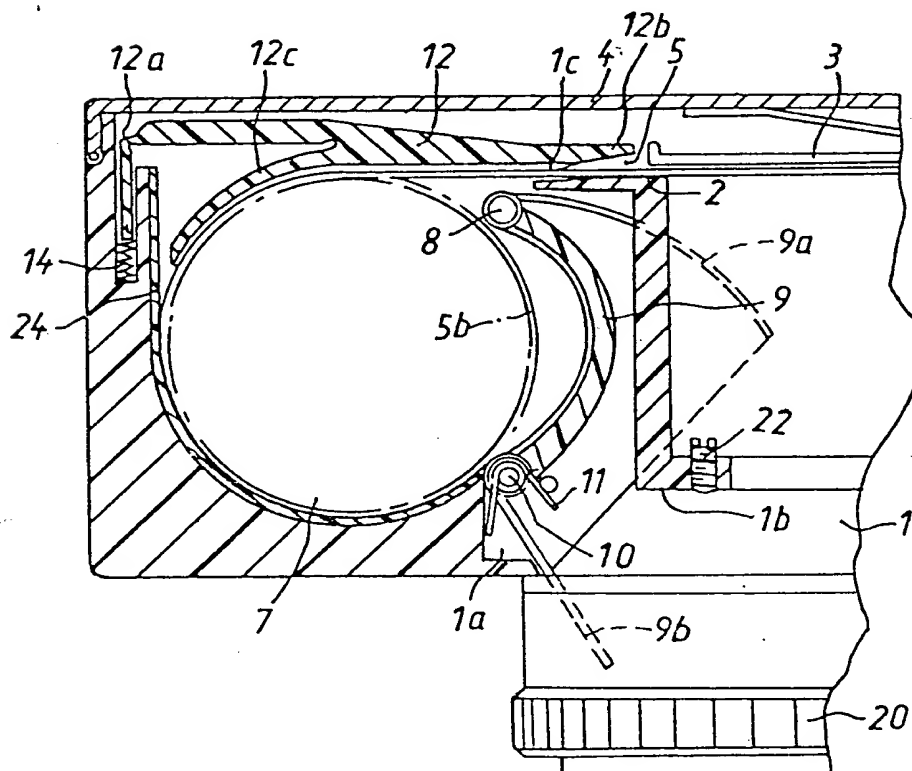


Fig. 3

SPECIFICATION

Camera including a spool-less film take-up compartment

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This invention relates to a camera including a spool-less film take-up compartment. More particularly, the camera is also provided with film coiling means provided in the take-up compartment to coil the film as it is fed into the compartment.

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Cameras of this kind are known, for example, from German Patent No. 1,115,571 in which a perforated photographic roll film is transported by means of a sprocket wheel from a cartridge into the film take-up chamber. In this case, a spiral spring is used as the film coiling means. According to German Utility Model No. 1,952,673 it is also known to employ glide foil strips as the coiling means in cameras of this kind, the foil strips forming a substantially closed cylindrical loop in the closed state of the camera. Spiral spring loops have also been used as coiling means in spool-less film cartridges. However, the functional efficiency of such known film coiling means depends very largely on their elasticity and slip or friction properties, so that they are either unsuitable or, due to the use of high quality materials and precision-forming methods, very expensive for application in cameras where (in contrast with spool-less film cartridges) they are required to function reliably over many years.

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German Patent No. 1,294,180 describes a roll film camera having an automatic film-threading device which comprises a resilient or spring-loaded guide plate which closes off the film take-up compartment with respect to the rear cover of the camera and which may be mounted on hinges, and an elastic, arcuate guide lever having its concave side directed towards the film spool in the take-up compartment. A leading end of the film, after having been passed between a film track and the guide plate, is pressed against pick-up means on the film spool and on rotation of the latter becomes threaded onto the spool. At an end of the guide lever opposite a perforation zone of the film there is provided a roller designed to prevent damage to the film and to reduce friction between film and lever as the diameter of the film coil grows progressively larger. In an initial condition, the lever and its roller bear on the circumferential wall of the take-up spool. This kind of automatic film-threading device can be far more easily controlled and has a considerably longer useful service life than the film-coiling means described above: however, it cannot be used for spool-less film take-up compartments.

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it is an object of the present invention to obviate or mitigate the above-noted drawbacks and disadvantages.

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According to the present invention, a camera comprises a housing, a first compartment in the housing, adapted to receive a container of photographic film, film transportation means operable to feed said film from said container, a second spool-

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less compartment in the housing for receiving the film fed from said container, film coiling means provided in the second compartment to coil said film therein, and guide means to guide the film to the coiling means, the film coiling means including a guide member biased towards a position wherein it extends into the second compartment and defines with a side wall of the latter a small space suitable for shaping a leading end of said film into an initial coil in said space, the guide member being mounted for movement relative to the housing such that it moves to expand said space as the film becomes progressively coiled therein.

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The film coiling means provided by the invention is capable of operating with constant effectiveness over long periods of service, can be made immune to tolerances in manufacture, and is easy to produce as well as fit in the camera.

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Preferably, an end portion of the guide member remote from the side wall of the second compartment is provided with at least one roller to engage the film as it becomes coiled in said space. Two such rollers may be provided, positioned so as to engage opposite marginal portions of the film, respectively.

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The guide member may be mounted for pivotal movement relative to the housing about a pivot axis which is conveniently disposed in a recess in the side wall of the second compartment. Where the second compartment is disposed adjacent to a photographing lens of the camera, this recess may be provided in that part of the side wall of the second compartment which is nearest to the photographing lens, such that it is directed towards the lens and away from a film track which guides the film between the first and second compartments.

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In one particular arrangement, the amount by which the guide member can extend into the second compartment under the action of its bias is determined by engagement of the guide member with a stop formed by an edge between the side wall of the second compartment and the aforesaid recess. Alternatively, the stop may be adjustably mounted on the housing and positioned to engage an arm on the guide member.

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Advantageously, a guide element is provided to close the second compartment relative to the rear of the housing, and co-operates with a film track which guides the film between the first and second compartments to define a slot through which the film passes to enter the second compartment. The guide element may be pivotally mounted on the housing so that it can be pivoted away from the film track. Furthermore, a surface of the guide element which faces the interior of the second compartment may be configured to form a continuation of the side wall of the compartment and may co-act with the guide member.

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Desirably, the guide member presents a surface to the above-mentioned space which, at least in the vicinity of its end remote from the side wall of the second compartment, is concave towards said space. A surface of the guide member which faces away from

the space may be configured to steer the leading end of the film towards the space. More especially, the surface may be thus configured in the regions which are disposed so as to engage opposite marginal portions of the film, respectively.

As an alternative to the guide lever being configured in this manner, a guide piece can be provided which adjoins the film track and extends into the second compartment, a surface of the guide piece which faces the interior of the second compartment being configured to form a continuation of the side wall of the compartment, and a surface of the guide piece which faces away from the interior of the second compartment co-operates with said surface of the guide element to form a channel to steer said leading end of the film towards said space. The guide piece may be connected to the guide element so that it is pivotable jointly therewith.

In a particular embodiment of the invention, the side wall of the second compartment is provided with at least one roller which is engaged by the film as it is coiled in the above-mentioned space. Thus, two such rollers could be provided, disposed to engage opposite marginal portions of the film, respectively. In an alternative arrangement, the side wall of the second compartment can be provided with the glide foil instead of the roller or rollers. The side wall may also be provided with glide tracks which engage opposite marginal portions of the film, respectively.

The invention will now be further described, by way of example only, with reference to the accompanying drawings, in which:—

Figure 1 is a plan view, partly in section, of one embodiment of a camera according to the present invention;

Figure 2 is a sectional plan view of part of a second embodiment of a camera according to the present invention, showing a photographic film being fed into a take-up compartment; and

Figure 3 is a similar view to Figure 2 but showing the film when fully coiled in the take-up compartment.

Referring first to Figure 1, the camera illustrated therein comprises a housing 1 in which there are provided a compartment adapted to receive a container 6 (such as a cartridge or magazine) of photographic film, a film track 2 along which the film (referenced 5) is fed from the container 6, and a spool-less take-up compartment 7 in which the film from the container 6 is received. Although not shown, the camera also comprises a film transport device which is operable by means of a winding-on handle to transport the film 5 from the container 6 to the compartment 7. This device can take any conventional form, and may for example include a sprocket wheel which engages perforations in marginal portions of the film and which is rotatable to transport the film. The sprocket wheel may be operative in both directions of film transport (i.e. to return the film 5 back into the container 6 after exposure as well as to feed the film forwardly). Alternatively, a gripping device can be employed to feed the film forwardly, with the film being rewound into the container 6 by rotating a spool of the latter. The rear of

the housing 1 is open but is normally closed by a rear cover 4 which carries a pressure plate 3 for pressing the film 5 against the track 2.

Provided in the take-up compartment 7 is a mechanism for coiling the film as it is fed into the compartment. This mechanism includes a guide lever 9 which is pivotally mounted on the housing 1 and which is biased by a spring 11 into a position wherein it extends into the compartment 7, as indicated in solid lines. The guide lever 9 carries a roller 8 at its free end. A pivot shaft 10 of the guide lever 9 is mounted in a recess 1a in a side wall of the compartment 7. The recess 1a is provided in the neighbourhood of that part of the compartment side wall which is nearest to a photographing lens 20 of the camera, and is directed towards the lens 20 and away from the film track 2. That part of the compartment side wall which extends between the rear cover 4 and the recess 1a is generally part-circular cylindrical in shape, the diameter of the circle being slightly larger than the largest envisaged diameter of a film when fully coiled in the compartment 7.

When the compartment 7 is empty, the guide lever 9 bears at a point close to its pivot shaft 10 on an edge 7a between the side wall of the compartment and the recess 1a. In this position, the guide lever 9 and the compartment side wall co-operate to define a space which, by virtue of the concave surfaces presented by the lever 9 and the compartment side wall, is configured to shape a leading end 5a of the film into a tight coil as shown. As the film end 5a is fed between the roller 8 and the compartment side wall, it is thus induced to form an initial coil. Upon further feeding of the film 5, additional turns are formed around the initial coil and the diameter of the coiled film thus progressively increases. At the same time, the guide lever 9 is pushed progressively outwards against the bias of the spring 11 to enlarge the aforementioned space. Finally, when the film is fully coiled in the compartment 7 (as indicated at 5b), the lever 9 has reached the position shown by chain-dotted lines. The roller 8, together with a further roller 21 provided in the side wall of the compartment 7, serves to reduce friction as the film 5 is progressively coiled and to press each newly formed coil against the coil of film already present in the compartment 7, so that the final coil 5b is wound tightly.

It is important that, during initial feeding of the film 5, its leading end 5a is directed and steered through the gap between the roller 8 and the opposed part of the compartment side wall. In principle, this may be achieved by any conventional film guide provided between the film track 2 or the pressure plate 3 and the compartment 7. However, a particularly convenient and appropriate guide is shown in Figure 1 and will now be described.

A guide plate or lever 12 is provided to close off the take-up compartment 7 with respect to the rear of the camera housing 1. One end 12a of the lever 12 bears through the intermediary of an interposed spring 14 on the housing 1 at the end of the compartment 7, while its other end 12b is applied to or pressed against the film track 2 by the action of the spring 14. This creates a narrow gap or slot 1c between the end 12b of the lever and the film track 2.

When a container of film is inserted into the camera, the leading end 5a of the film can now be fed manually through this slot so that the film will be transported into the compartment 7 during the first film feeding step. Alternatively, the pressure plate 3 may end so close to the slot that the leading end of the film is automatically fed or threaded into the slot during the first film feeding operation. Furthermore, the lever 12 may be provided with a cam and, when closed, the rear cover 4 of the camera may press on the cam so that the slot will be slightly expanded against the action of the spring 14, thereby reducing the amount of pressure to which the film is subjected and preventing stretching or similar damage being caused to the film.

As such, the provision of a guide plate corresponding to the lever 12 is already known. However, in contrast with these known guide plates, the lever 12 includes a steering arm 12c providing an arcuate surface between the slot 1a and the part-circular cylindrical portion of the compartment side wall. This surface steers the leading end 5a of the film directly towards the compartment 7 and guides it past the roller 8 into the small space defined by the guide arm 9 for the formation of the first coil turn.

In order to avoid the risk of a film end 5a which happens to be very tightly radiussed (as is occasionally the case) lifting off the surface of the steering arm 12c and slipping into the space between the roller 8 and the rear of the lever 9, which would cause a malfunction, the slot 1c should be continue very nearly up to the tip or end of the steering arm 12c and following the curvature of the latter. In Figure 1 this is achieved by arranging a guide piece 23 as a continuation of the film track 2, the guide piece 23 having a surface 23a which is substantially parallel to and which faces the steering arm 12c. The opposite surface 23b of the guide piece 23 (which faces towards the take-up compartment 7) is part-circular cylindrical in shape and co-operates with the roller 8 when the latter occupies the position shown in chain-dotted lines to define a large coiling space for a full film coil 5b.

Thus, the leading end 5a of the film is guided through the extended slot 1c formed between the steering arm 12c and the guide piece 23, into the small coiling space and is shaped along the lever 9 into a first coil turn. Further coil turns are then successively formed over the first turn, the coil growing progressively in the outward direction and the lever 9 being correspondingly pushed further and further outwards. Preferably two, instead of one, rollers 8 are mounted on the guide lever 9, and these rollers engage the film 5 in the marginal perforation zones of the latter. A similar modification can be made to the roller 21 also. In addition, instead of allowing the whole film 5 to slide and scrape along the wall of the take-up compartment 7, it is advisable to provide gliding ridges or skids 7b on the side wall of the compartment. These skids 7b correspond configurationally to the shape of the side wall and are disposed so that they engage the film at its marginal perforation regions.

The camera shown in Figures 2 and 3 is generally similar to that described above with reference to

Figure 1, and accordingly similar parts are according to the same reference numerals. However, the guide piece 23 is now omitted and the guide lever 9 is instead provided on its rear with skids 9a which engage the film at its marginal perforation regions. Like the guide piece 23, these skids 9a prevent a potentially tightly radiussed film end 5a from slipping into the area behind the guide lever 9, as can be seen to advantage in Figure 2. When the film is fully wound in the take-up compartment 7 (as indicated at 5b in Figure 3), the skids 9a are swung out into empty areas in the camera.

In the embodiment of Figures 2 and 3, the starting position of the guide lever 9 is determined by the abutment of an angled arm 9b thereon with an adjusting screw 22 mounted in a bearing 1b of the camera housing. By varying the length of that part of the screw 22 which stands proud of the wall 1b, the starting position of the lever 9 can be very accurately adjusted. Thus, notwithstanding even major manufacturing tolerances, the starting position of the guide lever 9 and its roller 8 relative to the side wall of the take-up compartment 7 can be accurately set, so that precisely identical starting conditions for the formation of the film coil can be readily set up in all cameras of a given type. The coil-forming process no longer depends in any way on parts or elements which are particularly susceptible to tolerance variations, such as notably springs and elasticity forces. The provision of the guide lever 9 admits relatively large tolerance limits in the force characteristics of the spring 11.

Also in the embodiment of Figures 2 and 3, the roller or rollers 21 are omitted and instead the side wall of the take-up compartment 7 is provided with a glide or slip foil 24 to promote sliding of the film around the side wall. A similar foil could also be fitted to the rear cover 4 to take the place of the lever 12 when the cover is closed.

Both of the embodiments described above have the following features in common: a region or part of the side wall of the take-up compartment is configurationally matched with the shape of the full film coil 5b and, jointly with an elastic or spring-loaded guide lever 9, defines a suitably small coiling space inside the compartment 7 for the shaping of a first, tightly radiussed winding turn in a film coil. A leading end 5a of the film is steered into this space by suitable guide means 12c, 23a or 12c, 9a. Due to the elastic mounting or spring loading of the guide lever 9, the said coiling space is gradually expanded corresponding to the increasing diameter of the growing film coil 5b while the curved shape and/or the free extremity 8 of the guide lever 9 pulls each coil as it is produced over the winding turns formed earlier.

CLAIMS

1. A camera comprising a housing, a first compartment in the housing adapted to receive a container of photographic film, film transportation means operable to feed said film from said container, a second spool-less compartment in the housing for receiving the film fed from said container, film coiling means provided in the second compartment to coil said film therein, and guide means to guide the film to the coiling means, the film coiling

means including a guide member biased towards a position wherein it extends into the second compartment and defines with a side wall of the latter a small space suitable for shaping a leading end of said film into an initial coil in said space, the guide member being mounted for movement relative to the housing such that it moves to expand said space as the film becomes progressively coiled therein.

2. A camera as claimed in Claim 1, wherein an end portion of the guide member remote from the side wall of the second compartment is provided with at least one roller to engage said film as it becomes coiled in said space.

3. A camera as claimed in Claim 2, wherein the guide member is provided with two such rollers which are positioned so as to engage opposite marginal portions of the film, respectively.

4. A camera as claimed in Claim 1, 2 or 3, wherein the guide member is mounted about a pivotal movement relative to the housing about a pivot axis.

5. A camera as claimed in Claim 4, wherein the pivot axis of the guide member is disposed in a recess in the side wall of the second compartment.

6. A camera as claimed in Claim 5, wherein the second compartment is disposed adjacent to a photographing lens of the camera, and said recess is provided in that part of the side wall of the second compartment which is nearest to the photographing lens and is directed towards said lens and away from a film track which guides said film between the first and second compartments.

7. A camera as claimed in Claim 5 or 6, wherein the amount by which the guide member can extend into the second compartment under the action of its bias is determined by engagement of the guide member with a stop formed by an edge between the side wall of the second compartment and said recess.

8. A camera as claimed in any one of Claims 1 to 6, wherein the amount by which the guide member can extend into the second compartment under the action of its bias is determined by engagement of the guide member with a stop which is adjustably mounted on the housing and is positioned to engage an arm on the guide member.

9. A camera as claimed in any preceding Claim, wherein the guide member presents a surface to said space which, at least in the vicinity of its end remote from the side wall of the second compartment, is concave towards said space.

10. A camera as claimed in any preceding Claim, wherein a guide element is provided to close the second compartment relative to the rear of the housing, and co-operates with a film track which guides the film between the first and second compartments to define a slot through which the film passes to enter the second compartment.

11. A camera as claimed in Claim 10, wherein the guide element is pivotally mounted on the housing so that it can be pivoted away from the film track.

12. A camera as claimed in Claim 10 or 11, wherein a surface of the guide element which faces the interior of the second compartment is configured to form a continuation of the side wall of the compartment and co-acts with the guide member.

13. A camera as claimed in Claim 12, wherein a guide piece adjoins the film track and extends into the second compartment, a surface of the guide piece which faces the interior of the second compartment being configured to form a continuation of the side wall of the compartment, and a surface of the guide piece which faces away from the interior of the second compartment co-operates with said surface of the guide element to form a channel to steer said leading end of the film towards said space.

14. A camera as claimed in Claim 13, wherein the guide piece is connected to the guide element and is pivotable jointly therewith.

15. A camera as claimed in any one of Claims 1 to 12, wherein a surface of the guide member which faces away from said space is configured to steer said leading end of the film towards said space.

16. A camera as claimed in Claim 15, wherein said surface is thus configured in regions which are disposed so as to engage opposite marginal portions of said film, respectively.

17. A camera as claimed in any preceding Claim, wherein the side wall of the second compartment is provided with at least one roller which is engaged by the film as it is coiled in said space.

18. A camera as claimed in Claim 17, wherein two such rollers are provided and are disposed to engage opposite marginal portions of said film, respectively.

19. A camera as claimed in any one of Claims 1 to 16, wherein the side wall of the second compartment is provided with a glide foil.

20. A camera as claimed in any preceding Claim, wherein the side wall of the second compartment is provided with glide tracks which engage opposite marginal portions of the film, respectively.

21. A camera substantially as hereinbefore described with reference to Figure 1 or Figures 2 and 3 of the accompanying drawings.

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